ChamSys

MagicHD

MagicHD Media Player

User Manual

Version 1.6.5.0

www.chamsys.co.uk

About this Manual

This manual is designed for operators of the MagicHD media player to help them quickly and effectively learn how to use the software. The reader is assumed to have a basic familiarity with the concepts of media players and lighting control systems. Since MagicHD is designed to be controlled by the MagicQ range of lighting consoles, the reader should also be familiar with MagicQ.

Readers who are tight for time and just want to find out how to quickly program a working show should turn straight to the Getting Started section on page *8*.

ChamSys Ltd

The features and functions of the MagicHD media player and the ideas contained therein are the property of ChamSys Ltd. The media player is intended for the control and display of moving and static images. No warranties are expressed or implied regarding the use of the MagicHD media player. No liabilities are accepted for the accuracy of the information contained within this manual.

The MagicHD media player product is supplied and designed by ChamSys Ltd.

Products containing ChamSys Ltd software and firmware embody proprietary information and are licensed not sold and may not be duplicated in any way.

ChamSys Ltd does not guarantee the accuracy, adequacy, suitability or completeness of any information or products and is not responsible for any errors or omissions or the results obtained from use of such information or products.

ChamSys Ltd does not accept responsibility for the consequences of misuse or abuse of its software.

None of the equipment or software supplied by ChamSys Ltd may be used in any life-critical or potentially life-endangering situations or in situations where personal injury may result.

ChamSys Ltd reserves the right to make any changes and/or improvements or to discontinue any and all of their products or services without prior notice, and advises customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability. Some of the available functions of products may be altered over the life of the product.

All other product names are trademarks or registered trademarks of their respective owners.

No part of this publication may be reproduced or distributed, transmitted, transcribed, stored in a retrieval system, or translated into any language in any form by any means without the prior written permission of ChamSys Ltd.

Copyright 2014 by ChamSys Ltd. All rights reserved.

www.chamsys.co.uk

Table of Contents

1 Introduction....6
1.1 Disclaimer....6
1.2 Known Problems....7
1.3 Changes....7
1.4 References....7
2 Getting Started....8
2.1 Super Quick Start....8
2.2 Quick Start....8
2.3 Adding a Mask....9
2.4 HUD....9
2.5 Keystone....9
2.6 Projector Colour Control....9
2.7 Displaying Text....9
2.8 MagicHD Window....10
2.9 Adding Media....10
2.10 Converting Existing Media....11
2.11 LED Wall....11
2.12 Playing Audio....11
3 Using MagicHD....12
3.1 MagicHD Versions....12
3.1.1 Stand-alone....12
3.1.2 Combined....12
3.2 MagicQ Setup....12
3.2.1 Combined Version....12
3.2.2 Stand-alone Version....13
3.3 The Application Window....13
3.4 Full Screen Mode....13
3.5 Settings....14
3.5.1 Stand-alone Version....14
3.5.2 Combined Version....14
3.6 Status....15
4 Media....16
4.1 Adding Media....16
4.1.1 Automatic Conversion....16
4.1.2 Deployment....18
4.1.3 Notes....18
4.2 Masks....19
4.2.1 Examples....20
4.2.2 Mirroring and Inverting....21
4.2.3 Notes....22
4.3 Audio....22
5 Media Layers....23
5.1 Intensity....23
5.2 Position....23
5.3 Scale....23
5.4 Rotation....23
5.5 Mirror/Flip....23

5.6 Stretch....23
5.7 R/G/B....24
5.8 Colour Effect....24
5.9 Blend....25
5.10 Folder and File....25
5.11 Start and End Frame....25
5.12 Speed....26
5.13 Play Mode....26
5.13.1 Once....26
5.13.2 Once-then-black....26
5.13.3 Loop....26
5.13.4 Bounce....26
5.13.5 First frame....27
5.13.6 Last frame....27
5.13.7 Pause....27
5.13.8 Next frame....27
5.14 Transition....27
5.15 Mask Opacity....27
5.16 Mask Folder and File....27
5.17 Mask Invert....27
5.18 Mask Mirror/Flip....28
5.19 Mask Stretch....28
5.20 Audio Gain....28
5.21 Audio Pan....28
6 Text Layer....29
6.1 Intensity....29
6.2 Position....29
6.3 Scale....29
6.4 Rotation....30
6.5 R/G/B....30
6.6 Background R/G/B....30
6.7 Background Transparency....31
6.8 Text Folder and File....31
6.9 Font....31
6.10 Text Lines....31
6.11 Scroll Direction....31
6.12 Scroll Speed....31
6.13 Loop....32
6.14 Pause 1....32
6.15 Pause 2....32
6.16 Scroll Char....32
6.17 Scroll Line....32
6.18 Scroll Time....32
7 Output Layer....33
7.1 Intensity....33
7.2 Position....33
7.3 Scale....33
7.4 Rotation....33
7.5 Mirror/Flip....33
7.6 R/G/B....33

7.7 Colour Effect....33
7.8 Mask Folder and File, Invert, Mirror/Flip....34
7.9 Keystone....34
7.10 HUD Control....35
7.11 Audio Volume....35
8 Head Up Display....36
8.1 HUD Anatomy....37
9 DMX Personality....38
9.1 Universe....38
9.2 Output Layer....39
9.3 Text Layer....40
9.4 Media Layers....41
9.5 Parameter Types....42
9.5.1 Angle....42
9.5.2 Audio Pan....42
9.5.3 Audio Scale....42
9.5.4 Blend Type....42
9.5.5 Colour Effect....43
9.5.6 Colour Scale....44
9.5.7 Direction....44
9.5.8 Duration....44
9.5.9 Flag....44
9.5.10 HUD Control Bitmask....44
9.5.11 Keystone....45
9.5.12 Layer Stretch Mode....45
9.5.13 Mirror / Flip....45
9.5.14 Number....45
9.5.15 Play Mode....46
9.5.16 Scale....46
9.5.17 Screen Offset....46
9.5.18 Speed Factor....46
9.5.19 Text Loop Mode....47
9.5.20 Transition Type....47
10 Background Information....48
10.1 Video Clips....48
10.2 Files and Folders....48
Appendix A Changes To DMX Personalities....49
A.1 Changes in Version 1.6.1.4....49
A.2 Changes in Version 1.6.1.6....50
A.3 Changes in Version 1.6.5.0....51

1 Introduction

MagicHD is a DMX controlled media player. Media playback is managed in layers. MagicHD can display up to 8 media layers (depending on product), one text layer and a final output layer for overall control of the output.

MagicHD runs on Windows, Mac and Linux, and can exist as a stand-alone player, or be launched from MagicQ PC. It can be installed on dedicated hardware, either supplied by the user, or purchased from ChamSys. See [1].

Each media layer can display one media file (movie or picture) and optionally apply a mask. Layers are stacked from 1 (the bottom) to 8 (the top). Subject to masking and blending, higher layers will hide lower layers. The output layer can also apply a mask, with the intention that this is used for shuttering, edge blending and similar projector control effects. You can of course use the masks for anything you wish.

The text layer can display static or moving text. The text is displayed in a window whose colour, position and orientation can be controlled. Content is supplied as raw text files.

Both the media and output layers can apply a number of basic colour effects. Effects applied in the output layer affect the appearance of the whole output.

Conceptually, the output seen by the viewer is the top of a stack of layers:

Top	Colour control
	Final mask
	Text
	Media N
	...
	Media 3
	Media 2
Bottom	Media 1

MagicHD has no user interface as such, being entirely controlled by DMX. It does provide a Head Up Display (HUD) which shows a lot of useful information, live, superimposed on the output.

The DMX control personality is deliberately simple: complexity is added by the lighting console. Since everything is controlled by DMX channels, the console can be used to add effects to any channel by simply altering the values sent to the player.

1.1 Disclaimer

This product is not fully released so the DMX personalities used to control it may change without notice. If such a change occurs then show files using MagicHD will have to be manually updated. Changes will be detailed in Appendix A .

1.2 Known Problems

Known major problems with MagicHD:

- Playback of multiple layers of some HD media content types can be jerky or slow the system down: load management is not yet implemented (whereby lower layers will skip frames to ensure the correct frame rate is maintained).
- Text layer is rendered at a fixed point size so text is blocky when a small number of lines fills the screen.
- Aspect ratio appears to change when objects are rotated.
- With Windows 8 MagicHD must be run as administrator for media conversion to work.
- Some content encoded with the jpeg2000 codec causes ffmpeg (the tool used to convert media) to crash. If this happens the user will have to convert the media offline with a different tool.

1.3 Changes

Changes to DMX personalities are described in Appendix A . These are changes that might break shows based on older versions.

1.4 References

[1] http://www.chamsys.co.uk/magichd
[2] http://en.wikipedia.org/wiki/Video_compression_picture_types
[3] http://en.wikipedia.org/wiki/H.264/MPEG-4_AVC
[4] http://en.wikipedia.org/wiki/HSL_and_HSV

2 Getting Started

The following instructions assume you are using MagicHD as part of MagicQ PC (the combined version). Most steps are the same for other system configurations.

2.1 Super Quick Start

setup → NEW SHOW

patch → CHOOSE DIM/MEDIA → MagicHD → PATCH IT

In the patch keypad, type '1' and ENTER, then NO.
setup → VIEW SYSTEM → VIEW MEDIA
From the application menu:
Media Player → View Media Output
Media Player → Select Server, close.
Select the MagicHD window, position it in the required screen and press F11
media → Output → LOCATE → Layer 1 → LOCATE

2.2 Quick Start

setup → NEW SHOW

patch → CHOOSE DIM/MEDIA → MagicHD → PATCH IT

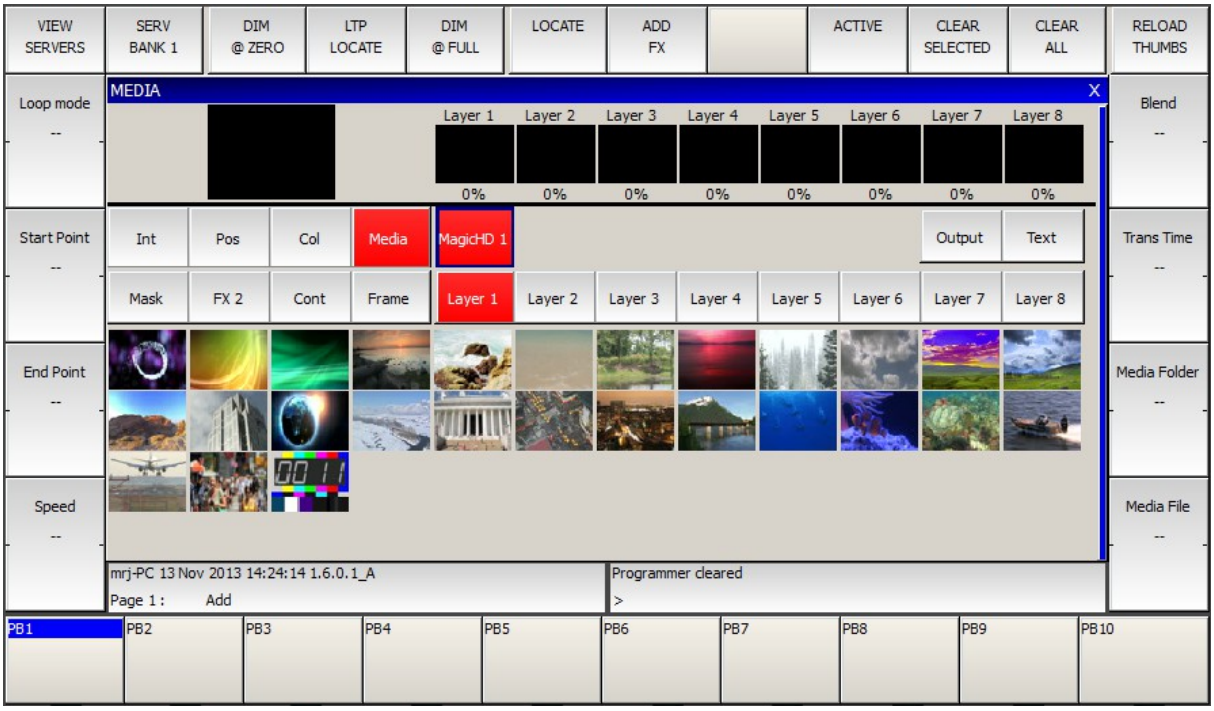
In the patch keypad, type '1' and ENTER, then NO.
MagicHD takes one whole DMX universe so there are no alternative configurations.
patch → VIEW DMX

to confirm.
setup → VIEW SYSTEM → VIEW MEDIA

should show server 1 being a MagicHD with **Local** as the IP address. This means it will be accessed directly, not over the network.
Edit the name if you wish: double click the name, or select the cell then press set twice.
Enable live previews for the server: double click on the **Live prev** cell and select YES, or select the cell and type 1, ENTER.
From the application menu:
Media Player → View Media Output
to start MagicHD. A blank window should appear. This can be moved around your screen(s) and maximised (without a border) by pressing F11.
Media Player → Select Server
allows you to choose the ID for the local MagicHD window.

media

will show the media window. The MagicHD that you just patched should appear as a button, along with buttons to select the media, text and output layers. If you have media, thumbnails should appear below the layer buttons:



Output → LOCATE → Layer 1 → LOCATE

will display the media from Media Folder 1/Media File 1 at full intensity.

2.3 Adding a Mask

media → MagicHD → Layer 1 → Mask

then use Mask Folder and Mask File to select a mask. Thumbnails should be displayed for each folder: simply select the mask by clicking a thumbnail.

2.4 HUD

media → MagicHD → Output → Media

will allow encoder wheel A to select the HUD. Alternatively press and hold “HUD Control” for buttons for each option, or click the top and bottom of “HUD Control” to cycle through the options.

2.5 Keystone

media → MagicHD → Output → Frame

2.6 Projector Colour Control

media → MagicHD → Output → Col

Red, Green and Blue encoders control the colour balance of the output.

2.7 Displaying Text

media → MagicHD → Text → LOCATE

Use Text Folder / Text File to select your text file. At this point you should see your text.
Use Pos to size and position the text layer (default is full screen)
Use Media → No Of Lines to control how much text is shown in the window
Use Media → Scroll Dir to control how the text scrolls if it doesn't fit into the window.

2.8 MagicHD Window

MagicHD is launched from within MagicQ PC from the “Media Player” menu. It can also be closed from here, or by closing its window.

The MagicHD window can be positioned and sized just like any other application window. To go full screen with no borders (i.e. ready for output to a projector), select the window and press F11, or select “Full Screen” from the Media Player menu.

MagicQ will remember the position and size of the window for when you next open it.

2.9 Adding Media

Chose a folder number that is either not in use, or will not clash with existing content. e.g. 13.

Chose file numbers that will not clash with existing content (unless you want to overwrite). e.g. 15-18.

Create a numbered folder away from MagicQ PC/convert. e.g.

```
temp
 └─ 013
```

Place your files in this folder. e.g.

```
temp
 └─ 013
     ├─ apple.mov
     ├─ banana.avi
     └─ orange.mp4
```

Add your chosen file numbers to the filenames. e.g.

```
temp
 └─ 013
     ├─ 015_apple.mov
     ├─ 016_banana.avi
     └─ 017_orange.mp4
```

Copy the finished folder(s) to MagicQ PC/convert

```
…/MagicQ PC
     └─ convert
          └─ 013
               ├─ 015_apple.mov
               ├─ 016_banana.avi
               └─ 017_orange.mp4
```

Wait for conversion to take place. Progress is reported on the HUD, and in the input display window (bottom right) in MagicQ PC.

You can prepare media under MagicQ PC/convert, but every time you edit a file it will trigger the conversion process, resulting in errors if the filenames aren't in the correct format.

2.10 Converting Existing Media

From the application menu: Media Player → Convert Media

Once MagicHD is running, the **Convert Media** action allows you to force it to convert old content. This means you can prepare media when MagicHD is not running. This is worth while if you are preparing a lot of content: if MagicHD is running it will keep trying to convert files as you edit their names and move them around (unless you prepare the files elsewhere).

Note: everything under MagicQ PC/convert will be converted, regardless of file age or previous conversion status.

2.11 LED Wall

To setup MagicHD with a low resolution output (e.g. an LED wall):

Start MagicHD and ensure the window is on the output screen. Press F11 to go fullscreen.

media → MagicHD → Layer 1 → Locate
then select some media that has clearly defined edges, e.g. one of the test patterns in Folder 3 (masks).
media → MagicHD → Layer 1 → Pos
then set Stretch to Fill X & Y.

media → MagicHD → Output → Pos
then use the Scale X, Scale Y, Pos X and Pos Y encoders to move and size the output layer to the extent of the visible output.

2.12 Playing Audio

To play media that includes audio:

media → MagicHD → Layer 1 → Locate
then select some media that has audio
media → MagicHD → Layer 1 → Int
set Audio Gain to a non-zero value.
media → MagicHD → Output → Locate
media → MagicHD → Output → Int
Ensure Audio Volume is not zero.

3 Using MagicHD

3.1 MagicHD Versions

3.1.1 Stand-alone

MagicHD is available as stand-alone software. It can be run separately from MagicQ PC.

- Controlled by Art-NET, ACN or Pathport.
- Window has simple menus for changing settings, including DMX protocol and address.
- All 8 layers unlocked when a MagicQ console, or a Wing system with encoder wheels, is detected on the network.
- One layer supported when no MagicQ console or Wing system is detected on the network
- Opens full-screen by default (for quick show startup or recovery).

3.1.2 Combined

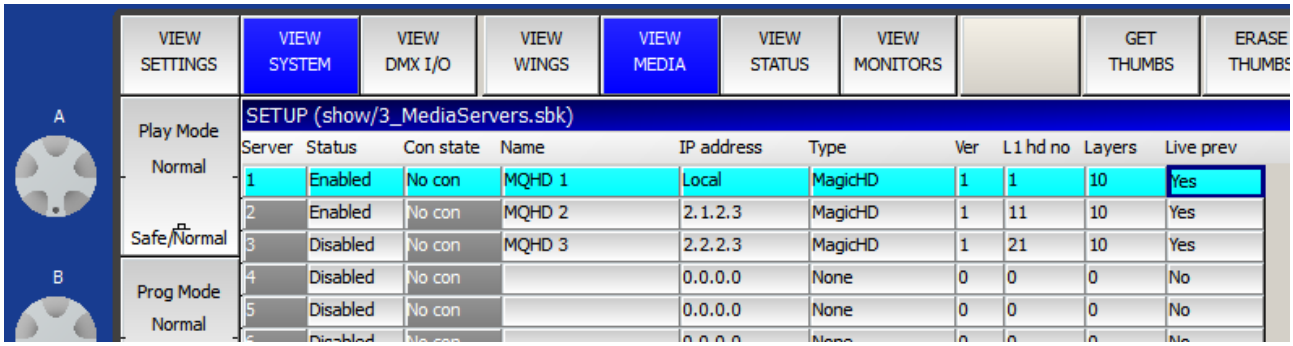
MagicHD is launched from the Media Player menu in MagicQ PC

- Controlled directly by MagicQ (no network comms).
- All 8 layers always available
- Starts full screen if a MagicQ Wing is connected, and MagicHD was previously used full-screen (for quick show startup or recovery)
- Can be selected to duplicate the output of any MagicHD that is patched in the show (e.g. to see the media output while programming a show).
- Can be used in its own right to output to a projector from a second monitor output.

3.2 MagicQ Setup

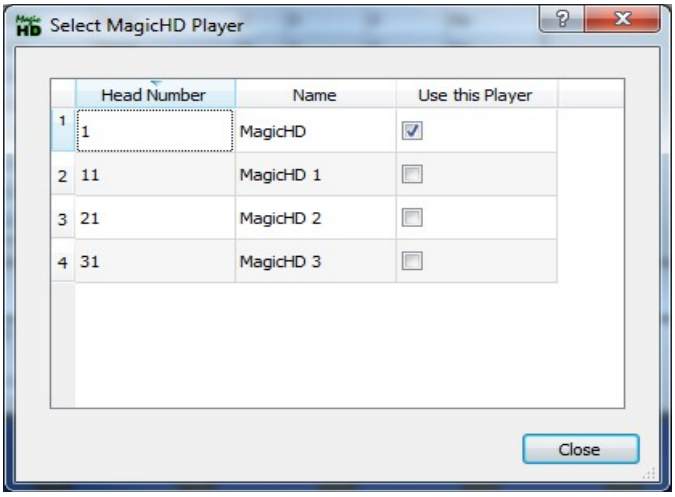
3.2.1 Combined Version

When MagicHD is launched from MagicQ PC it does not use the network. The connection is direct, within the software. The media server settings (setup → VIEW SETTINGS → VIEW SYSTEM → VIEW MEDIA) should be as highlighted in this screenshot:


VIEW SETTINGS
VIEW SYSTEM
VIEW DMX I/O
VIEW WINGS
VIEW MEDIA
VIEW STATUS
VIEW MONITORS
GET THUMBS
ERASE THUMBS
A
B
Play Mode Normal
Safe/Normal
Prog Mode Normal
SETUP (show/3_MediaServers.sbk)
Server Status Con state Name IP address Type Ver L1 hd no Layers Live prev
1 Enabled No con MQHD 1 Local MagicHD 1 1 10 Yes
2 Enabled No con MQHD 2 2.1.2.3 MagicHD 1 11 10 Yes
3 Disabled No con MQHD 3 2.2.2.3 MagicHD 1 21 10 Yes
4 Disabled No con 0.0.0.0 None 0 0 0 No
5 Disabled No con 0.0.0.0 None 0 0 0 No

Note in particular, the IP address column shows “Local”. To select Local, enter 0 in that cell.

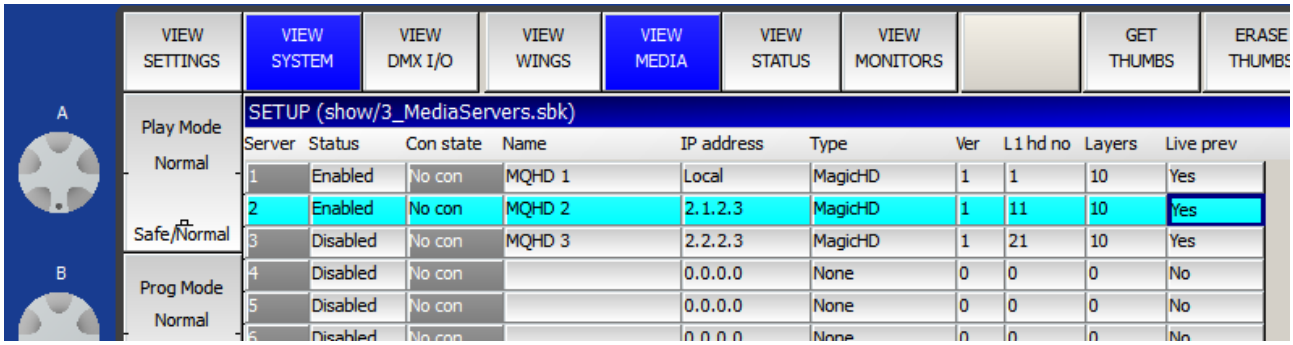
If you have networked MagicHDs patched in the show, you can use the local window to duplicate any one of these: from the application menu choose Media Player → Select Player. A dialogue box will pop up listing all the patched MagicHDs:



Note that players are listed by name: you should ensure that each player has a distinct name. To change a player's name, go to setup → VIEW SETTINGS → VIEW SYSTEM → VIEW MEDIA.

3.2.2 Stand-alone Version

To connect to a MagicHD using Art-NET, the MagicQ media server settings should be as highlighted in this screenshot:


VIEW SETTINGS
VIEW SYSTEM
VIEW DMX I/O
VIEW WINGS
VIEW MEDIA
VIEW STATUS
VIEW MONITORS
GET THUMBS
ERASE THUMBS
A
B
Play Mode Normal
Safe/Normal
Prog Mode Normal
SETUP (show/3_MediaServers.sbk)
Server Status Con state Name IP address Type Ver L1 hd no Layers Live prev
1 Enabled No con MQHD 1 Local MagicHD 1 1 10 Yes
2 Enabled No con MQHD 2 2.1.2.3 MagicHD 1 11 10 Yes
3 Disabled No con MQHD 3 2.2.2.3 MagicHD 1 21 10 Yes
4 Disabled No con 0.0.0.0 None 0 0 0 No
5 Disabled No con 0.0.0.0 None 0 0 0 No

3.3 The Application Window

Both versions of MagicHD run in an application window like most other software. The window can be positioned, maximised, minimised and closed, in the usual way. Window position is remembered from one session to the next.

3.4 Full Screen Mode

To enter or leave full screen mode (i.e. a frameless window occupying the whole screen) press F11 (Mac: ⌘-Shift-F), or select “Full Screen” from the “Media Player” menu in MagicQ PC.

In full screen mode MagicHD hides the menu bar, and the mouse cursor when it is inside the window, so that they do not appear in the projected image during a show.

The stand-alone version always starts full screen, ready to start (or continue) a show. This is because there will not normally be any user interaction with MagicHD. There might not even be a keyboard connected.

When the combined version detects a PC wing, or other MagicQ console that has encoder wheels, it also starts full screen, if it was last used in full screen mode. The assumption is that this setup is part of a show and the user does not want to waste time positioning the window.

Note that on a system with a single screen, if you press F11, the MagicHD window will take over the screen and the mouse cursor will vanish. This can be confusing because it appears that you have lost control of the computer. Just press F11 again to leave fullscreen mode.

3.5 Settings

There are only a few settings for the user to alter, to configure MagicHD. Nearly everything is done via DMX.

3.5.1 Stand-alone Version

The stand-alone MagicHD has a simple menu bar.

File	**Settings**	Change the universe and DMX protocol that MagicHD responds to
	About	Version and status information
	Exit	Close the MagicHD window
View	**Full Screen**	Toggle full screen mode
Media	**Convert Media**	Force conversion of all media in the convert directory (see section 4)
	Stop Conversion	Stop media conversion if it is in progress
	Rebuild Index	Force the media index to be rebuilt
	Rebuild Thumbnails	Force all thumbnails to be rebuilt

3.5.2 Combined Version

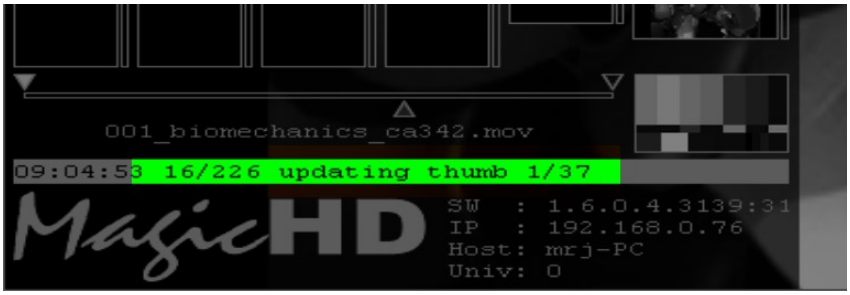
MagicHD settings are accessed from the Media Player sub-menu in MagicQ PC:

View Media Output	Toggle the MagicHD window
Select Player	From the patched MagicHDs in the show, select which one to emulate in the local window
Load MagicHD Demo	Load the MagicHD demo show, and open the player window
Full Screen	Toggle full screen mode
Convert Media	Force conversion of all media in the convert directory (see section 4)
Stop Conversion	Stop media conversion if it is in progress
Rebuild Index	Force the media index to be rebuilt
Rebuild Thumbnails	Force all thumbnails to be rebuilt
Deploy Media	*TBD*

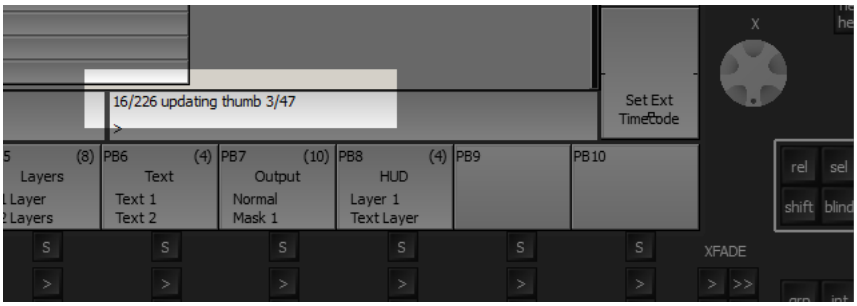
3.6 Status

MagicHD is intended to be used to control a projector or video screen in a show environment, using DMX. As such there is no mechanism to feed status back to the user. Apart from the HUD there is no GUI. MagicHD reports warnings, errors and some supporting information, to its log file (see 10.2), but this is only intended for *post mortem* analysis.

When there is status to feed back to the user it appears in the status bar on the HUD:



and in the combined version, in the input display window in MagicQ PC:



4 Media

Media refers to movies, images, and text files. MagicHD can display all common image formats, and play almost any format of movie, although a number of restrictions apply. If you want to do anything other than play the entire movie forwards at normal speed the movie must contain only I-frames [2]. This is because playing backwards, skipping frames, or randomly accessing points within the clip requires that any frame can be displayed by itself. Performance will also be affected by file size, so consideration must be given to the quality (i.e. degree of compression) of the movies.

Media is always addressed by a pair of DMX channels: folder and file. Wherever a media file can be selected, you will find the folder/file parameters. If MagicHD can't make sense of the selected file, in the context, it will be ignored. For example a movie could be selected as a mask, but it will not have any effect because it is not an image. When selecting media, if either the folder or file is zero, the effect is 'no selection'.

4.1 Adding Media

MagicHD is supplied with a library of basic content to get you started, but most users will want to add their own content. Folders 1 to 9 are reserved for ChamSys libraries, and you are free to use folders 10 to 255 in any way you like. Folder and file numbers do not have to be sequential.

Internally MagicHD stores media in numbered folders. Within each folder the file names start with a number. The folder and file number are the DMX folder/file parameters used to select that file. An index file is used to tell MagicHD which files to use (see section 10.2). For MagicHD to be able to use a new file it must be named correctly, placed in the right folder, and added to the index. To simplify this process, it is automated:

4.1.1 Automatic Conversion

MagicHD monitors a folder called **convert**. When media files are added to that folder they are automatically converted (if required) then moved to the show's media folders. Once converted, the files are added to MagicHD's media index and can be used right away (without restarting).

Files must be placed in a subfolder, under **convert**, whose name starts with a number (nnn, below). This number is taken to be the folder number of the resulting media file. The rest of the folder name is optional and is ignored by MagicHD. The file's name must start with a number (fff, below) then an underscore. This number is taken to be the media's number within its folder. The rest of the filename, after the underscore, is not processed, but copied verbatim. User folders start from 10 and file numbers start from 1:

```
.../MagicQ PC
      └─ convert
            ├── nnn_folder_name
            :     └─ fff_file_name.mov
```

Monitoring for new files, and converting them, are background activities and do not impact playback. MagicHD only looks for changes to files, or the addition of files or folders. Any files already in place when MagicHD starts will be ignored. To trigger conversion of existing files just edit the file or folder name: adding or removing a leading zero is sufficient. Within MagicQ PC, the menu item Media Player → Convert Media can be used to force MagicHD to re-convert everything in the **convert** folder. This can be useful if new media has been prepared *in situ* before starting MagicHD.

The criteria for triggering conversion (rather than just copying the media) are:

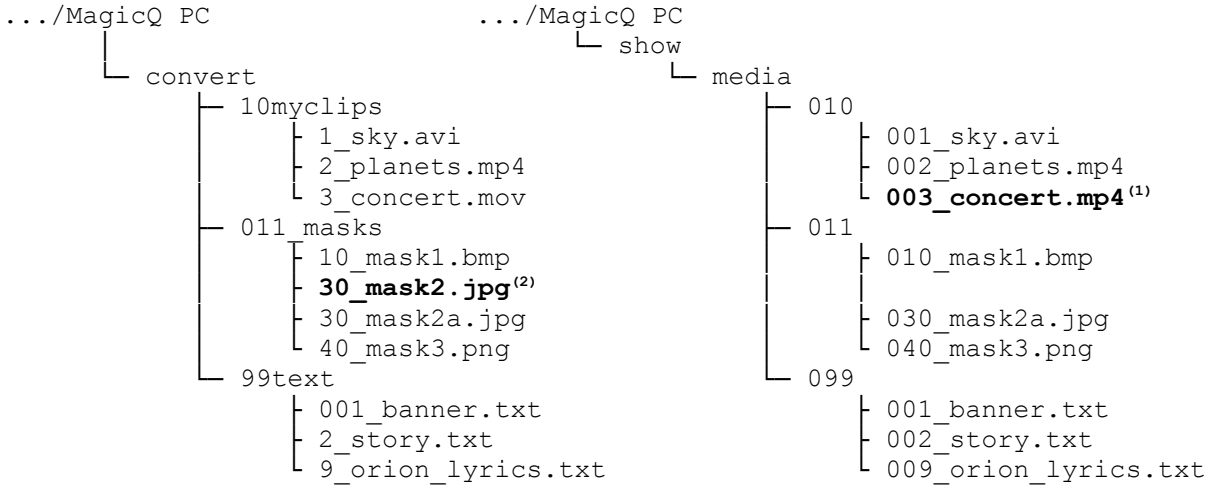
Movie content	Action
Non I-frames	Converted to .mp4 (H.264 video [3]) with all I-frames. Note that this process decompresses the video, usually resulting in a much larger file than the original.
Audio	Converted to 2-channel stereo 16 bit PCM if present.
Video codec	Any content encoded with the jpeg2000 or cinepak codecs is converted to H.264. These codecs have been found to cause problems with thumbnail extraction.
Pixel Format	MagicHD can only decode a fixed number of pixel formats (the representation of colour data within each frame). Content that uses unknown formats is converted to H.264 with a known pixel format.

Pictures and text files are copied unchanged, as are any movies that already meet the criteria above.

If you wish to exercise full control over the quality and format of your content, prepare it offline before placing it in the conversion area. If the content meets the basic criteria of all I-frames and no audio, it will not be converted, thus preserving the original quality and format.

This diagram illustrates the relationship between the **convert** folder and the resulting media:

User files **Resulting media**



Note:

(1) 3_concert.mov was converted to .mp4 because it was compressed video.

(2) 30_mask2.jpg was overwritten by 30_mask2a.jpg because both files had the same media number.

None of the following files would be converted, for the reasons given:

```
.../Magic PC
      ├─ convert_files
      │     └─ 1_one.avi                  wrong root folder
      └─ convert
            ├─ 2_two.mp4                  not under a numbered folder
            ├─ clips
            │     └─ 3_three.avi          folder has no number
            ├─ 1_folder_one
            │     └─ 4_four.png           only folder numbers 10 to 255 are allowed
            ├─ 10_new_media
            │     ├─ five.txt             file has no number
            │     ├─ 0_six.txt            only file numbers 1 to 255 are valid
            │     ├─ 7_seven.doc          only .txt files are allowed for text
            │     └─ 300_seven.txt        only file numbers 1 to 255 are valid
            └─ 20_more_movies
                  ├─ E_eight.mp4          'E' is not a number
                  └─ 9nine.mp4            number not separated by an underscore
```

4.1.2 Deployment

To simplify deploying the media for a show, and deploying media from one player to another, MagicHD performs some automatic housekeeping processes in the background. It monitors the convert directory, it checks that the index file is present(see 10.2) and it checks that there are up-to-date thumbnails for all media.

Because of these automatic checks, it is possible to manage your media content directly in the show folder by editing the folder and file numbering. When finished, simply delete the index file and thumbnail folder, then start MagicHD. Alternatively, use the menu options Media → Rebuild Index and Media → Rebuild Thumbnails.

4.1.3 Notes

Please note the following points:

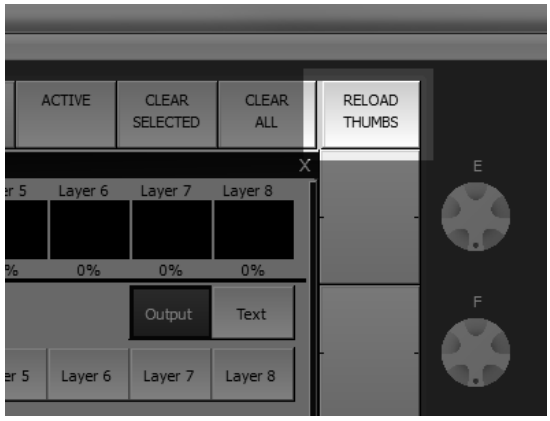
Monitoring and conversion take place in the background so that they do not impact media playback. This means it is possible to add media during a show, but this **is not** recommended. It also means conversion, and index or thumbnail regeneration, do not start immediately.

MagicHD only checks periodically for new files, out of date index, and missing thumbnails, so the conversion process will not start immediately when a new file is added. The conversion process can last a significant time if large movies are involved. You can monitor progress by bringing up the HUD (see 7.10, 8.1 and 3.6).

The conversion process is:

1) new files are converted,
2) the index is updated,
3) out of date thumbnails are regenerated

While media is being converted, the thumbnails displayed in MagicQ's media window will be out of date. Once the thumbnails are ready the combined version will show new thumbnails as soon as you change folder in the media window. For remote servers, press the RELOAD THUMBS button (or shift for RELOAD ALL THUMBS):



Until the index has been rebuilt, MagicHD will not be able to display new media.

If the contents of an existing file changes, MagicHD will not automatically reload it. To force a reload, select a different file, then the original one.

Feedback on progress is displayed on the status line of the HUD, and recorded in the conversion log file.

The results of media conversion are logged in a dedicated file (see 10.2). For each file, some some basic statistics are reported, and the reason for conversion is logged.

If you bypass the conversion process, and put new media directly into the show folders, MagicHD will not get the chance to convert the file format to one that it understands. MagicHD might not be able to read your media. If you choose to manage media files directly, **make sure you test every file before the show**.

4.1.3.1 Thumbnail Regeneration

Each media file has a small thumbnail image associated with it. These thumbnails are used by MagicQ to display the contents of each media folder in the media window.

If any thumbnail file is found to be missing, or older than the corresponding media file, it will be automatically regenerated.

Thumbnail regeneration can be forced from the menu (see 3.5).

4.1.3.2 Index Regeneration

If the media index file is missing MagicHD will automatically regenerate it from the media files in the show.

Note that all media will be included in the index. There is no way to mark a file as not part of the show, other than obscuring its folder and/or file number.

Index regeneration can be forced from the menu (see 3.5).

4.2 Masks

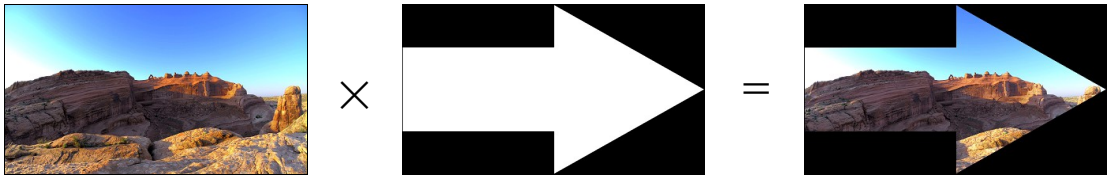
A mask is simply an image whose intensity is used to control the brightness of some media behind it. White areas are totally opaque and black totally transparent. Shades of grey scale between the two. The simplest masks have just black and white areas, and hide the layer (allowing lower layers to be seen) where they are black. Any image can be used as a mask. Colour is converted to transparency by taking the black & white intensity of the image.

If a mask is used in a layer its position is automatically synchronised with the media for that layer. As the layer is scaled, positioned or rotated, the mask is too. This greatly simplifies the use of masks.

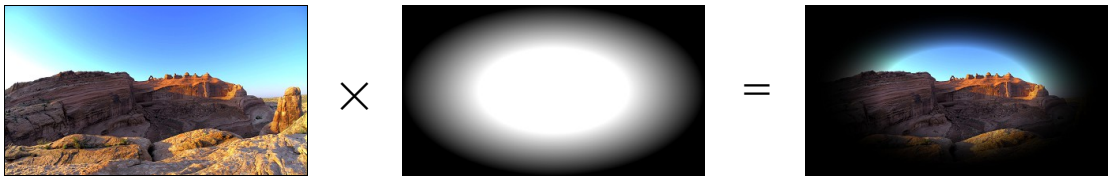
Any media can be used as an independent mask by loading it into a layer above the layer to be masked. If the media has transparency, this will reveal the layer below automatically. If you wish to control how the mask works, the **Mask** colour effect can be used (see 9.5.5).

4.2.1 Examples

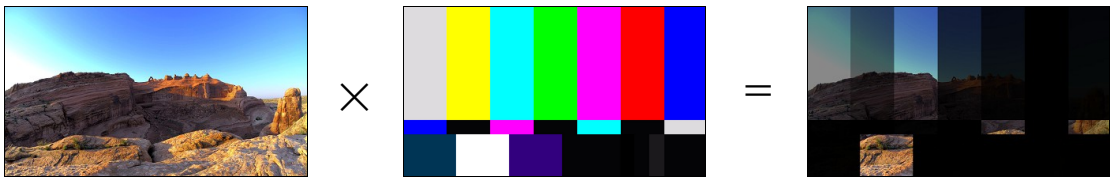
If we look at one frame of video and a simple black & white arrow as a mask, the results are as follows:



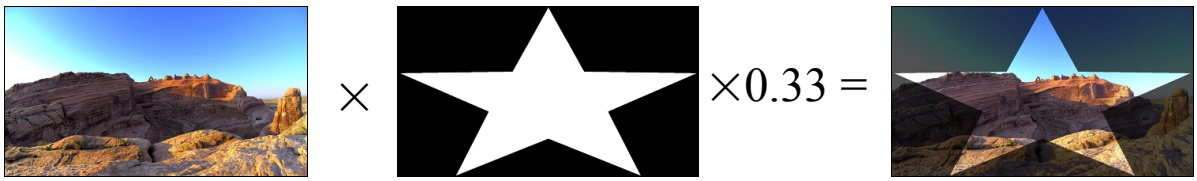
If we have a more complicated grey scale mask, the effect is as follows:



And if we use a coloured mask, this is the result:

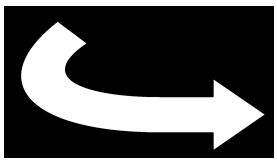


The examples above have the mask intensity set to full. Reducing the mask's intensity reduces its effect. Here is a mask at 0.33 intensity:

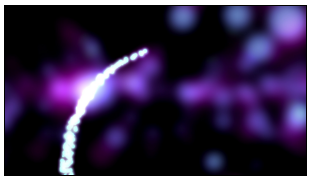


4.2.2 Mirroring and Inverting

One image can produce a number of different masks depending on its mirror/flip and invert parameters:

	Normal	Mirrored	Flipped	Mirrored & flipped
Normal				
Inverted				

If the same mask is used on two layers, inverted in one, the layers can be blended together as follows:

Layer 1		×		=	
Layer 2		×		=	
Output Layer					

Note that it is not actually necessary to use the mask on layer 1, since layer 2 overlays it anyway. The effect of the mask in layer 1 is that as layer 2 is faded out, layer 1 retains the black masked out area.

4.2.3 Notes

Whatever the aspect ratio of an image used as a mask, its “screen” is the extent of the media for that layer. If the mask is stretched to **Fill X & Y** it will fill the area occupied by the media, not necessarily the whole screen. This can be overridden by the mask stretch parameter for the layer.

For best results create your masks at the same resolution as your media, and use anti-aliasing to minimise visible pixellation around curves etc.

4.3 Audio

If a media clip contains audio MagicHD will automatically play the audio if the following criteria are met:

Parameter	Value
Direction	Forwards
Speed	Normal (i.e. 1.0)
Gain	> 0
Intensity	> 0
Audio Codec	16 bit PCM

If audio is present in a clip it will automatically be converted to the correct format when the media is converted (even if the video is already in the correct format).

By default, gain for each layer is 0, so that audio is not heard. This is to prevent unwanted surprises: you must choose to set the gain above zero to hear audio.

Each media layer, and the output layer, have a number of audio parameters. See 5 and 7.

The volume for each media layer is automatically faded with the layer's intensity. This means that it is not possible to have audio without the corresponding video. The overall volume of all layers is controlled by the output layer's volume: this is also faded with the output layer intensity.

5 Media Layers

Each media layer can display either a movie or a static image. A mask can be used to control which parts of the layer are visible. The DMX parameters for the layer allow you to control the following features.

For details of the Media Layer personality, refer to section 9.4. For details of the DMX parameters, refer to section 9.5.

5.1 Intensity

Intensity is used to fade the layer into, or out of, the output. As a layer's intensity reduces, lower layers will show through.

5.2 Position

Position controls where the centre of the layer appears in the output.

5.3 Scale

Scale magnifies or reduces the size of the layer in the output.

Note that when magnified, low resolution content can look poor.

5.4 Rotation

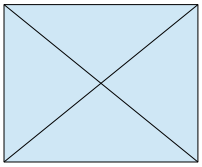
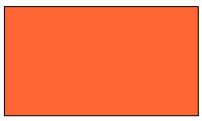
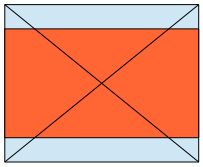
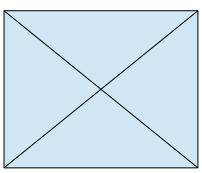
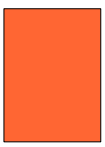
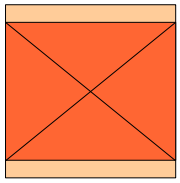
Rotation allows a layer to be rotated around its centre point.

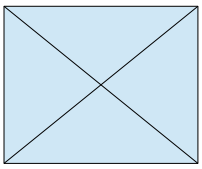
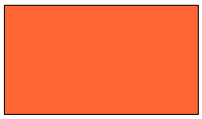
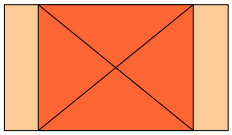
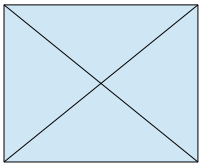
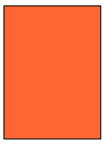
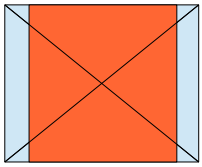
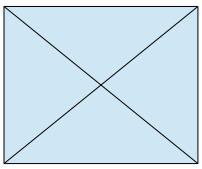
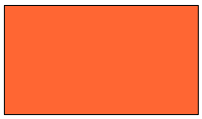
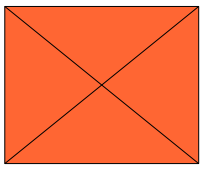
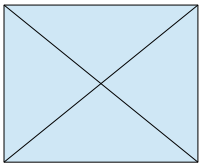
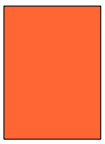
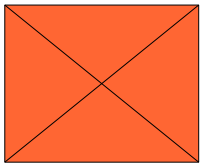
5.5 Mirror/Flip

Mirror and flip allow the layer to be reflected horizontally (mirror) or vertically (flip), or both.

5.6 Stretch

Stretch controls how the layer fills the screen. Every media file has an associated aspect ratio and this might not match the aspect ratio of the screen or projector. Stretch controls how the two aspect ratios are reconciled:

Mode	Screen	Media	Result	Note
Fill X				Media aspect ratio maintained
Fill X				Media aspect ratio maintained. Overflows Y

Mode	Screen	Media	Result	Note
Fill Y				Media aspect ratio maintained. Overflows X
Fill Y				Media aspect ratio maintained.
Fill X & Y				Media stretched in Y. Aspect ratio lost
Fill X & Y				Media stretched in X. Aspect ratio lost

5.7 R/G/B

The R, G and B parameters allow the colour balance of the layer to be altered directly.

5.8 Colour Effect

Colour effect, along with the associated R, G and B effect parameters, allows you to alter the colour of the layer in a number of ways. For details refer to the DMX parameter in section 9.5.5. A large number of effects are possible, and the best way to understand the parameters is to experiment.

Here are some examples:

Colour Effect	FX R	FX G	FX B	Result
Posterise	3	3	3	Each of R,G,B quantised to 4 levels.
Colourise	255	130	40	Sepia
Colourise	0	255	0	Black & Green (“night vision”)
Mask	0	-	-	The layer is used as a mask. The lighter the image, the more transparent it is. If the image is black and white, white will show the layer below, and black will not (and will show as black).
Key	85	128	255	“Green screen” : any pure green will become transparent.
RGB Select	3	2	1	RGB → BGR colour swap
RGB Select	5	6	7	Inverted colour
RGB Select	8	8	8	Inverted black and white
RGB Select	0	2	0	Green only (similar to Black & Green)
RGB Select	0	4	0	Black & Green

5.9 Blend

Blend controls how each layer is blended with the one below, in terms of colour and intensity. Blending takes place from the lowest layer upwards: Layer 2 blends with Layer 1, then Layer 3 blends with the result of 1 and 2, and so on.

Normally layers are simply blended by brightness and transparency: when a layer is completely opaque (full intensity, no mask), nothing can be seen through it. Normally, as a layer is faded, it becomes transparent so things below it start to show through. If a mask is applied, dark areas of the mask make the layer transparent, allowing layers beneath to show through.

5.10 Folder and File

These allow the media for the layer to be selected. If either are zero, the layer is switched off.

5.11 Start and End Frame

Start and end frame allow frame-wise control of which part of a movie is played. The default values are a start frame of zero and an end frame of 2^{23} which mean the whole file is to be used. If the end frame is less than the length of the clip, playback will stop (or loop) when the end frame is reached. Similarly playback can be started at any point in the file by setting the start frame.

To set the start and end frame accurately, use the **First Frame** or **Last Frame** play mode whilst changing the start or end frame values respectively. Turning on the HUD for the layer being programmed will also help since the start and end frame markers are shown on the media bar (see section 8.1.

To take complete control of playback speed (e.g. to bounce a clip between two points in time to a beat), use “First Frame” play mode, then apply a ramp effect to the start frame channel.

Note:

- Although any values can be set in the DMX channels, the actual start frame will never exceed the end frame, nor will the end frame ever be earlier than the start frame.
- If you are using start and end frame to permanently edit a clip (i.e. you don't change them or use a different part of the file in another cue), consider editing off-line since (a) the resulting file will be smaller and (b) using dedicated video editing software can produce better results.
- The values in the DMX channels refer directly to the frame numbers within the media. Frame numbers run continuously from 0 to the end of the file.
- The time that a frame number equates to depends on the frame rate of the file.

5.12 Speed

Use the speed parameter to control the speed and direction of media playback. Negative speeds cause playback in reverse. A speed of 0 stops playback (although see 5.13.7).

Up to 2 times normal speed, every frame is played. Bear in mind, therefore, that playing an HD clip x1.9 faster will nearly double the processing load for that layer. Above x2, frames are dropped to reduce the processing load. There is still an increased load for all but whole number multipliers: at x4.7, 3 out of every 4 frames are dropped, so the remaining load is x1.7.

Since there is an inherent loss of quality at high playback speeds (because the human brain can't process the imagery so well), consider the quality and resolution of the source material carefully.

5.13 Play Mode

Play mode allows a movie clip to be played in a number of different ways:

5.13.1 Once

The movie is played one, from the start frame to the end frame, controlled by the speed parameter.

Playback finishes on the last frame, which is held. If playback is in reverse (negative speed) the last frame is actually the start frame.

5.13.2 Once-then-black

The same as **Once**, except the layer automatically blacks out after the last frame. This removes the need to set, and accurately time, a second cue to fade the layer at the end.

5.13.3 Loop

The same as **Once**, except playback loops to the first frame after the last frame.

When playing forwards, first = start and last = end. When backwards, first = end and last = start.

5.13.4 Bounce

The same as **Loop**, except the direction automatically changes each time.

Note that the speed parameter is automatically reversed, so that changes in magnitude do not suddenly reverse the direction if the sign of the speed does not match the direction. i.e. once the first reverse has taken place, only the magnitude of the speed parameter has any effect unless the speed crosses zero, where the direction of bounce would also change.

5.13.5 First frame

The current first frame is always shown. Although playback is therefore not “dynamic”, the start frame parameter can be altered in real time to control playback. See 5.11.

5.13.6 Last frame

The current last frame is always shown. Although playback is therefore not “dynamic”, the last frame parameter can be altered in real time to control playback. See 5.11.

5.13.7 Pause

Playback is paused at whatever the current frame is. This mode can be used in conjunction with other modes, and cues, to achieve more complex playback effects. For example it allows playback to be paused without setting the speed to zero, so playback can be restarted with the previous speed, whatever that might have been. The “resume” cue does not need to have the playback speed programmed.

5.13.8 Next frame

Advances the frame that is displayed, according to the speed parameter (i.e. direction and frame skipping for high speeds still apply), then automatically pauses. The mode must be changed away (e.g. to **Pause**), then back, before this mode can change the frame again.

This mode can be used in conjunction with **Pause** (or other modes) to achieve more complex playback effects.

5.14 Transition

Not implemented yet.

5.15 Mask Opacity

This parameter controls how opaque the mask is. If the opacity is full, the mask has complete control over the transparency of the layer. As the opacity is reduced, the mask has less effect: black areas that would have been completely transparent becomes less so, allowing less of the lower layers to show through. As opacity reduces to zero, the mask is effectively switched off. See 4.2 for an example.

5.16 Mask Folder and File

These allow the mask for the layer to be selected. If either are zero, no mask is selected. If a non-image file is selected (i.e. a movie or text file) the mask will have no effect.

5.17 Mask Invert

This parameter allows the intensity of the mask to be inverted. This means that what would be fully transparent becomes fully opaque and vice-versa.

The same mask can be used in two layers, inverted in one layer, to produce synchronised masking effects.

See 4.2 for examples.

5.18 Mask Mirror/Flip

This allows the orientation of the mask to be controlled independently from that of the media file for the layer.

If anything other than this simple level of control is required, the mask must be used by itself in a different layer so that it can be independently positioned and rotated.

5.19 Mask Stretch

This parameter governs how the aspect ratio of the mask image is matched to that of the layer's media. As far as the mask is concerned, the screen that it is being stretched to is actually the media file. If, for example, the media is appearing letter-boxed, setting mask stretch to “Fill X & Y” stretches the mask to the same extent as the media thereby altering the mask's aspect ratio.

5.20 Audio Gain

This parameter controls the audio level for the layer. A gain of zero turns off the audio playback.

This parameter is mainly intended to allows clips with different peak levels to be equalised.

5.21 Audio Pan

This parameter allows the stereo image to be moved from left to right.

6 Text Layer

The text layer displays the contents of the chosen text file over the top of the other media layers. The DMX parameters for the layer allow you to control the following features.

Text is displayed in a rectangular window, which by default occupies the whole screen. The colour of the window background, and its transparency, can be altered, giving control over the contrast and visibility of the text, when viewed over media.

The Text Layer expects media in the form of .txt files. When adding your own media, only this type of file will be converted. Although text files traditionally use just the ASCII character set, MagicHD can read and display extended characters if they are present in the text file.

For details of the Text Layer personality, refer to section 9.3. For details of the DMX parameters, refer to section 9.5.

6.1 Intensity

Intensity is used to fade the layer into, or out of, the output. As the layer's intensity reduces, the text will become less visible.

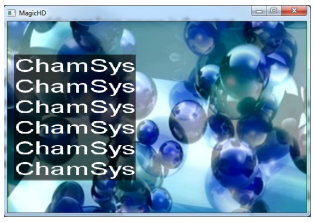
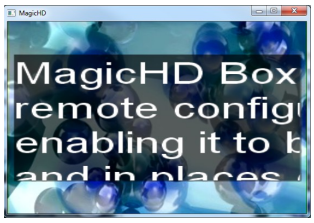
6.2 Position

Position controls where the centre of the text layer appears in the output.

6.3 Scale

Scale magnifies or reduces the size of the text layer in the output.

If position and scale are set to something other than full screen, the result is a text “window” appearing over the media layers. The chosen text is sized to fit this window. If the resulting text overflows the window, it is clipped (but can be scrolled). If it is smaller than the window, the window is shrunk to fit, rather than leaving a large area of unoccupied background. These examples show this in action. Note that in every case the text window was set to the same size .

Overflowing Condition	Result	Shrinking Condition	Result
Text wider than window		Text narrower than window	
Text taller than window		Text not as high as window	
Text taller and wider than window			

6.4 Rotation

Rotation allows the layer to be rotated around its centre point.

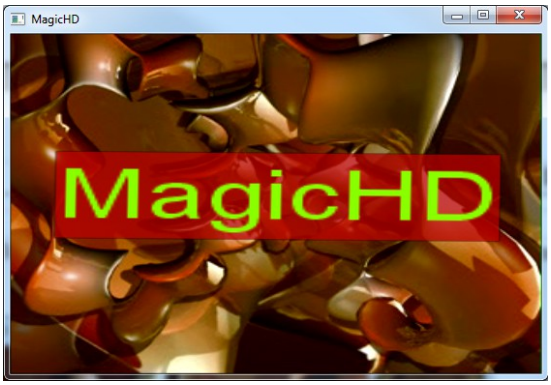
6.5 R/G/B

These parameters control the colour of the text.

6.6 Background R/G/B

These parameters control the colour of the text background. When the text layer is positioned smaller than full screen, the edges of the text window becomes visible, and you will notice the background colour of the layer.

In this example, R/G/B = 138/255/0 and background R/G/B = 255/0/0. Background transparency is 79:



6.7 Background Transparency

This parameter controls how transparent the text background is.

To ensure text can be seen over any background, transparency can be set to 0. This will completely block out what is behind the text window. A more gentle effect is to set the transparency to something between 25% and 50%, giving some contrast for the letters, but allowing the media beneath to show through.

Setting transparency to 255 effectively removes the text background. In this case the choice of text colour is important since it must be visible over the media layers.

6.8 Text Folder and File

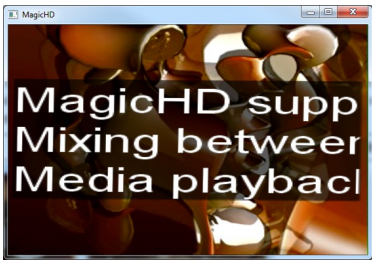
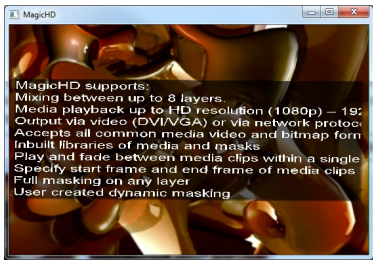
These allow the text for the layer to be selected. If either are zero, the layer is switched off.

6.9 Font

Not implemented yet.

6.10 Text Lines

This parameter controls the number of lines of text that are displayed vertically within the text layer. With a given size and position for the layer, increasing the number of lines means the size of the text will reduce so that the required number of lines fit:

Lines	1	3	10
Effect			

MagicHD
Magi
MagicHD
MagicHD supp
Mixing betweer
Media playbacl
MagicHD
MagicHD supports:
Mixing between up to 8 layers.
Media playback up to HD resolution (1080p) – 19
Output via video (DVI/VGA) or via network protoc
Accepts all common media video and bitmap forn
Inbuilt libraries of media and masks
Play and fade between media clips within a single
Specify start frame and end frame of media clips
Full masking on any layer
User created dynamic masking

6.11 Scroll Direction

This parameter controls the direction for scrolling text. Text will only scroll horizontally if it does not fit across the window, or vertically if it does not fit the height of the window.

6.12 Scroll Speed

This parameter controls the speed of scrolling. For horizontal scrolling the value is characters per second, and vertically, lines per second.

Note that to see the value corresponding to the DMX channel, turn on the HUD and set it to show the Text Layer parameters.

6.13 Loop

This parameter controls how the text behaves when it is scrolling, and what happens when the text has scrolled to the maximum extent.

Some modes are not implemented yet.

6.14 Pause 1

Not implemented yet.

6.15 Pause 2

Not implemented yet.

6.16 Scroll Char

Not implemented yet.

6.17 Scroll Line

Not implemented yet.

6.18 Scroll Time

Not implemented yet.

7 Output Layer

The output layer is used to control the overall appearance of the output from MagicHD. The output layer acts on the sum total of the media and text layers: they are effectively combined into one resulting image, which the output layer then manipulates.

Note that any setting that puts all or part of the output beyond the limits of the window, screen or projector output will result in those parts of the output being clipped.

For details of the Output Layer personality, refer to section 9.2. For details of the DMX parameters, refer to section 9.5.

7.1 Intensity

Intensity controls the overall brightness of the MagicHD output.

7.2 Position

Position controls where the MagicHD output appears within the window, screen or projected area.

7.3 Scale

Scale magnifies or reduces the size of the output.

7.4 Rotation

This parameter allows the output to be rotated within the extent of the window, screen or projected area.

7.5 Mirror/Flip

This parameter allows the output to be reflected, horizontally, vertically or both.

7.6 R/G/B

The R, G and B parameters allow the colour balance of the output to be altered directly.

Note that this alters all layers at the same time. For control of individual layers, use the colour parameters for that layer.

7.7 Colour Effect

Colour effect, along with the associated R, G and B effect parameters, allows you to alter the overall colour of the MagicHD output in a number of ways.

These parameters work in exactly the same way as for the Media Layers, so refer to section 5.8 (Media Layers, Colour Effect) for full details, and section 9.5.5 for details of the DMX parameters.

Note that this alters all layers at the same time. For control of individual layers, use the colour effect parameter for that layer.

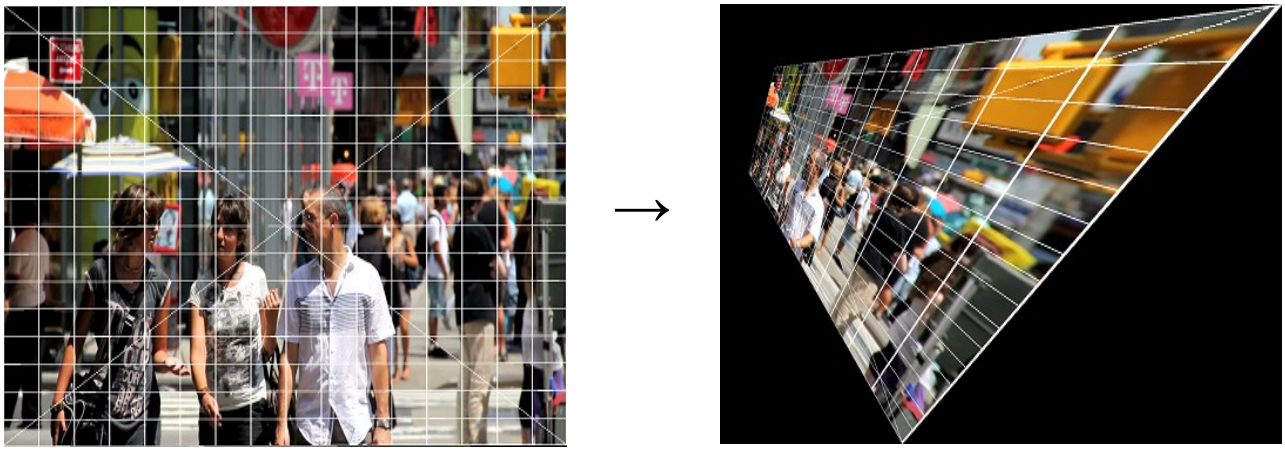
7.8 Mask Folder and File, Invert, Mirror/Flip

The output layer can optionally use a mask to achieve shuttering, edge blending, scenery blanking, or other effects. The mask is automatically stretched to fit the output layer and its opacity cannot be controlled.

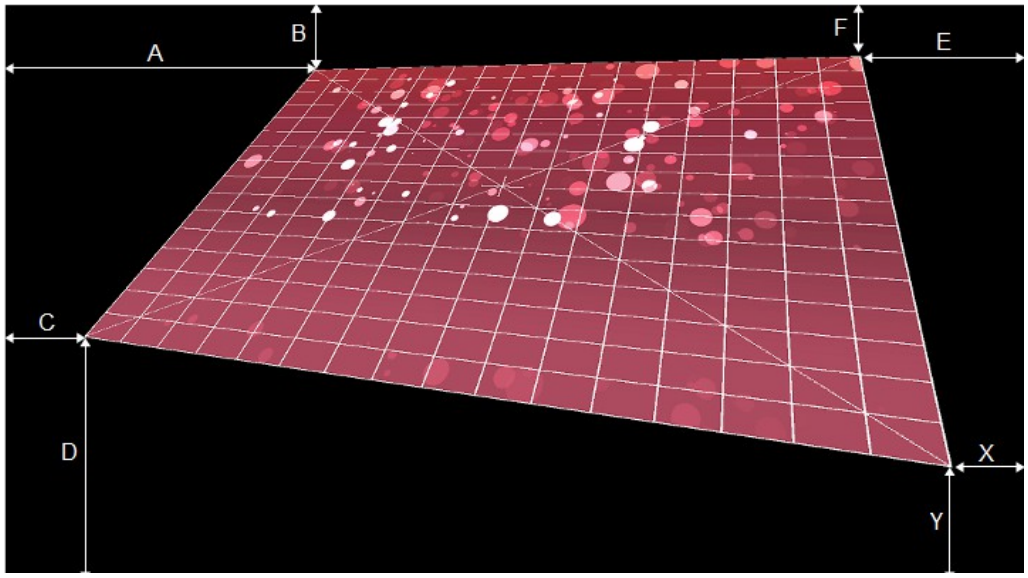
The mask parameters work in exactly the same way as the Media Layer mask parameters. See sections 5.16, 5.17 and 5.18.

7.9 Keystone

The keystone parameters apply keystone distortion to the output image:



The 8 keystone parameters move the corners of the image within the output screen:



The range of each parameter is the full screen width or height, with bottom left at (0,0) and top right at (1,1), but MagicHD will stop the resulting quadrilateral from becoming concave. Parameter names match the encoder wheels on MagicQ consoles.

When setting up keystone it can help to turn on the HUD grid (see 9.5.10) as shown in these screenshots.

7.10 HUD Control

The HUD control parameter turns the HUD overlay on and off, and selects which layer's DMX parameters are displayed. It is a bitmask, and details are given in section 9.5.10.

For a full description of the HUD, refer to chapter 8.

7.11 Audio Volume

This parameter controls the overall volume of audio from all media layers.

8 Head Up Display

The HUD allows the user to see live control data, and the status of the media player, overlaid on the projected output.

The HUD is always displayed on top of the output layer, and does not have any colour effects applied to it. It does get keystoned. It displays a border round the entire screen so that you can see the full extent of the projection area even when the output has been modified, distorted, or turned off. This allows a projector to be aligned even without media. Unless you are projecting on a very irregular surface, you should always be able to see the HUD no matter what configuration has been applied to the other layers.

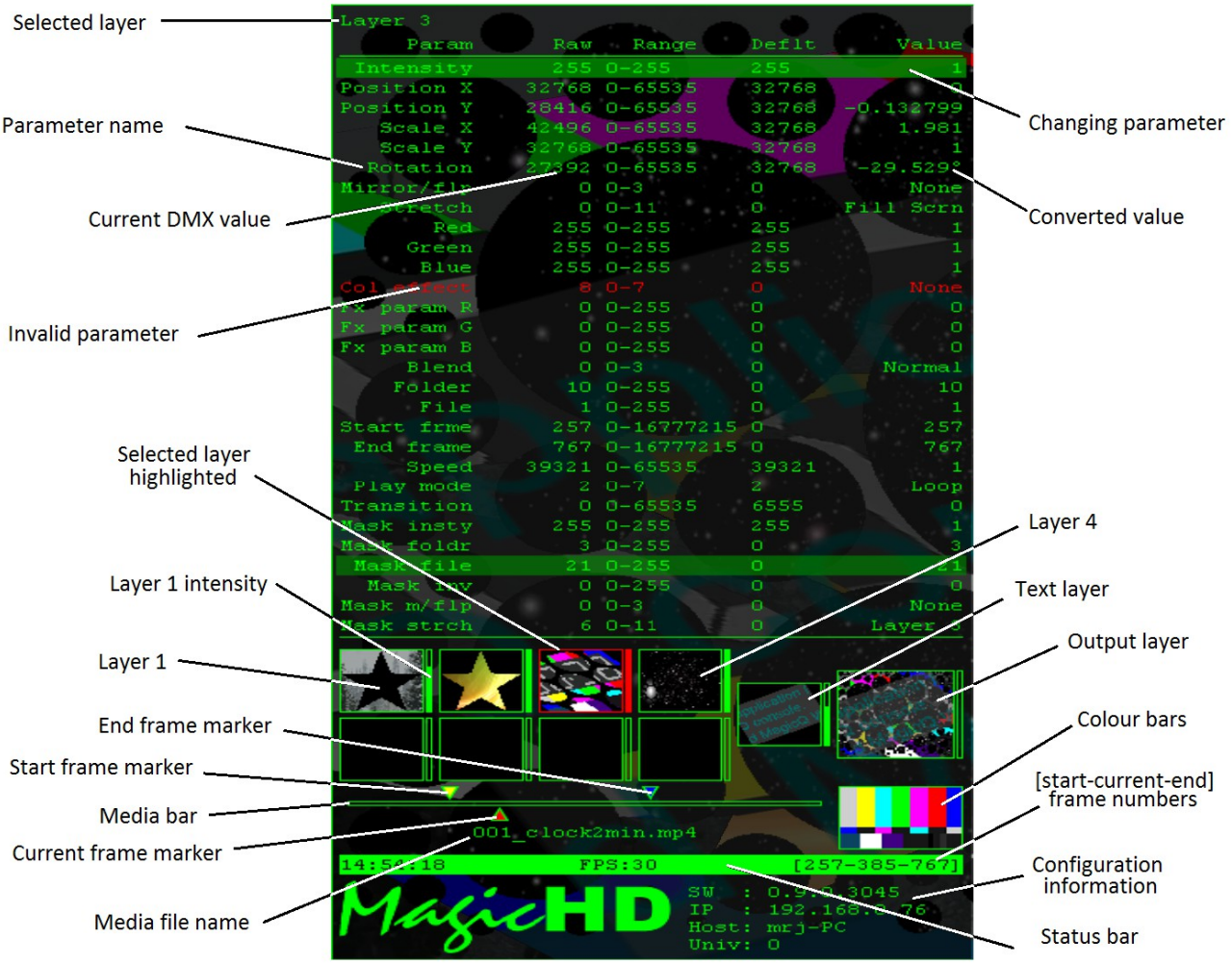
The DMX channel that controls the HUD allows it to be positioned left, centre or right of screen; and selects the layer whose DMX data is shown.

Thumbnails of each layer are shown, whether or not they are visible in the output. This allows the user to see *all* the content that is making up the output, not just what is visible.

Changing DMX parameters are highlighted, as are illegal/erroneous values. The raw DMX channel data is shown, along with the converted value (e.g. angle is shown as a 16 bit value, and also as the resulting angle in degrees). This helps you to understand the effect that the parameters have on the output.

The HUD can also display a grid to help with projector alignment and keystoning. Like the normal HUD display, the grid is not subject to output intensity or colour control, and appears whether or not any media is displayed.

8.1 HUD Anatomy



The top part of the HUD displays the DMX parameter for the selected layer. Each parameter occupies one row.

Below the DMX data are the layer thumbnails. These are updated live and show the content of each layer individually. Next to each thumbnail is a bar indicating the intensity of that layer. In the example above, layers 1 to 4, and the text layer, are programmed. The thumbnail of the resulting output layer can be seen, even though its intensity is 0.

The colour bars are part of the HUD to ensure that there is always full colour in the output no matter which effects have been applied. This gives confidence in what is being output to the projector.

Whenever a layer is showing moving content, the media bar is displayed. This shows dynamic information about of the movie.

The bottom right area shows static configuration information. This typically doesn't change unless the system is re-configured and the player restarted.

9 DMX Personality

Note that all multi-channel parameters are read big-endian. i.e. coarse setting followed by fine.

Parameters shown *in italics* are reserved but not currently implemented.

9.1 Universe

The MagicHD personality has been designed to fit within a single universe of DMX.

Block	Channels	Offset
Output layer	41	0
reserved	*9*	
Text layer	36	50
reserved	*14*	
Layer 1	42	100
reserved	*8*	
Layer 2	42	150
reserved	*8*	
Layer 3	42	200
reserved	*8*	
Layer 4	42	250
reserved	*8*	
Layer 5	42	300
reserved	*8*	
Layer 6	42	350
reserved	*8*	
Layer 7	42	400
reserved	*8*	
Layer 8	42	450
reserved	*8*	
spare	*12*	

9.2 Output Layer

Parameter	Channels	Offset	Default	Type
Intensity	1	0	0	Colour scale
Position X	2	1	32768	Screen offset
Position Y	2	3	32768	Screen offset
Scale X	2	5	32768	Scale
Scale Y	2	7	32768	Scale
Rotation	2	9	32768	Angle
Mirror/flip	1	11	0	Mirror / flip
Red	1	12	255	Colour scale
Green	1	13	255	Colour scale
Blue	1	14	255	Colour scale
Colour effect	1	15	0	Colour effect
FX parameter R	1	16	0	Number or Colour Scale depending on effect
FX parameter G	1	17	0	Number or Colour Scale depending on effect
FX parameter B	1	18	0	Number or Colour Scale depending on effect
Mask folder	1	19	3	Number
Mask file	1	20	0	Number
Mask invert	1	21	0	Flag
Mask mirror/flip	1	22	0	Mirror / flip
Keystone A	2	23	0	Keystone
Keystone B	2	25	65535	Keystone
Keystone C	2	27	0	Keystone
Keystone D	2	29	0	Keystone
Keystone E	2	31	65535	Keystone
Keystone F	2	33	65535	Keystone
Keystone X	2	35	65535	Keystone
Keystone Y	2	37	0	Keystone
HUD control	1	39	0	HUD control bitmask
Audio Volume	1	40	255	Audio scale

9.3 Text Layer

Parameter	Channels	Offset	Default	Type
Intensity	1	0	0	Colour scale
Position X	2	1	32768	Screen offset
Position Y	2	3	32768	Screen offset
Scale X	2	5	32768	Scale
Scale Y	2	7	32768	Scale
Rotation	2	9	32768	Angle
Red	1	11	255	Colour scale
Green	1	12	255	Colour scale
Blue	1	13	255	Colour scale
Background red	1	14	0	Colour scale
Background green	1	15	0	Colour scale
Background blue	1	16	0	Colour scale
Background transparency	1	17	192	Colour scale
Text folder	1	18	5	Number
Text file	1	19	0	Number
Font	*1*	*20*	*0*	*Number*
Text lines	1	21	1	Number
Scroll direction	1	22	0	Direction
Scroll speed	2	23	0	Speed factor
Loop	*1*	*25*	*0*	*Text loop mode*
Pause 1	*2*	*26*	*0*	*Duration*
Pause 2	*2*	*28*	*0*	*Duration*
Scroll char	*2*	*30*	*1*	*Number*
Scroll line	*2*	*32*	*1*	*Number*
Scroll time	*2*	*34*	*0*	*Duration*

9.4 Media Layers

Parameter	Channels	Offset	Default	Type
Intensity	1	0	0	Colour scale
Position X	2	1	32768	Screen offset
Position Y	2	3	32768	Screen offset
Scale X	2	5	32768	Scale
Scale Y	2	7	32768	Scale
Rotation	2	9	32768	Angle
Mirror/flip	1	11	0	Mirror / flip
Stretch	1	12	0	Layer stretch mode
Red	1	13	255	Colour scale
Green	1	14	255	Colour scale
Blue	1	15	255	Colour scale
Colour effect	1	16	0	Colour effect
FX parameter R	1	17	0	Number or Colour Scale depending on effect
FX parameter G	1	18	0	Number or Colour Scale depending on effect
FX parameter B	1	19	0	Number or Colour Scale depending on effect
Blend	*1*	*20*	*0*	*Blend type*
Folder	1	21	0	Number
File	1	22	1	Number
Start frame	3	23	0	Number
End frame	3	26	16777215	Number
Speed	2	29	39321	Speed factor
Play mode	1	31	2	Play mode
Transition	*2*	*32*	*0*	*Transition type*
Mask opacity	1	34	0	Colour scale
Mask folder	1	35	3	Number
Mask file	1	36	1	Number
Mask invert	1	37	0	Flag
Mask mirror/flip	1	38	0	Mirror / flip
Mask stretch	1	39	0	Layer stretch mode
Audio Gain	1	40	0	Audio scale
Audio Pan	1	41	128	Audio pan

9.5 Parameter Types

The best way to understand the effect of parameters is to turn on the HUD, watch the corresponding parameter change as you turn an encoder wheel, and see the effect on the output.

9.5.1 Angle

Angles are specified by two consecutive DMX channels, with the values 0-65535 representing the range -180° to +179.995°. One bit is 0.0055°. 32768 is 0.0°. Positive rotation is clockwise.

9.5.2 Audio Pan

Audio pan controls stereo panning using a linear scale of 0-255 with 0 representing full left, 128 centre, and 255 full right. 128 is the default.

9.5.3 Audio Scale

Audio scale controls audio parameters using a linear scale with the values 0-255 representing the range 0 to 1.0.

9.5.4 Blend Type

When blending two layers together, the colour of each pixel in the resulting image is controlled by the blend setting.

Value	Effect	Notes
0	Normal	Layers are blended by their intensity, as described in 5.9.
1	Add Colour	The higher layer is added to the lower layer.
2	Subtract Colour	The higher layer is subtracted from the lower layer.
3	Max Colour	The result uses the highest value from each layer.

9.5.5 Colour Effect

Value	Effect	Notes
0	None	
1	B&W	
2	RGB select	FX parameters are numbers, selecting the mapping for R,G and B colour channels as follows: 0 = Black 1 = R 2 = G 3 = B 4 = Intensity(1) 5 = inverse R 6 = inverse G 7 = inverse B 8 = inverse intensity(1)
3	Posterise	FX parameters are numbers, selecting the number of colour steps for R,G and B. 0 and 1 map to 1 step, i.e. 1 bit colour.
4	Colourise	FX parameters are colour scale values, controlling colourisation of the basic B&W image.
5	Mask(2)	Use the layer as a mask. FX parameter R is a number, controlling the mode: 0 = transparency = intensity(1) 1 = as 0, with inverted colour 2 = transparency = inverse intensity(1) 3 = as 2, with inverted colour
6	Key(2)	Chroma Key. FX parameters are colour scale values, specifying the colour to match. The matched colour is made transparent. The R parameter selects hue (see [4]). The G parameter controls selectivity (0 = narrow, 255 = wide) The B parameter selects transparency (0 = gradual, 255 = all transparent).
7	Hue	Hue offset. The FX parameter R controls the amount of offset. “Hue” refers to H in the HSL colour model[4], so offsets of 0(0°) and 255 (360°) have no effect, and 128(180°) turns red into cyan, yellow into blue etc.
8	Curve 1	*Not implemented yet.*
9	Curve 2	*Not implemented yet.*
10	Curve 3	*Not implemented yet.*

(1) Intensity is the overall brightness of the image; effectively the black & white version of it.
(2) Not implemented in the output layer, because it is an inter-layer effect.

9.5.6 Colour Scale

Colour, intensity, transparency etc. are specified by a linear scale with the values 0-255 representing the range 0 to 1.0.

9.5.7 Direction

Value	Direction
0	None
1	Left
2	Right
3	Up
4	Down

9.5.8 Duration

Linear scale with the values 0 to 65535 representing the range 0 to 10 seconds. Note that all 65536 values are mapped, but the resolution is only 1ms.

Value	Duration/ms
0-6	0
7-13	1
6554-6560	1000
65535	9999

9.5.9 Flag

Flags use the DMX values 0 and 1 (or any non-zero value), where 0 means 'false', 'off', etc; and 1 'true', 'on'. The player will interpret any value from 1-255 as true.

9.5.10 HUD Control Bitmask

The HUD is controlled channel is treated as a bitmask except for a few special values

Bits	Value	Meaning
0-3	0-15	Layer: 0-7 = Media layers 8 = Text layer 9 = Output layer 10+ = none
4-5	16,32	Position: 0 = off 1 = Left 2 = Centre 3 = Right
6-7		Unused
	255	Grid

9.5.11 Keystone

Linear scale with the values 0 to 65535 representing the range 0 to +1.0. The default value is 0.0 (0) or 1.0 (65535) depending on the corner.

9.5.12 Layer Stretch Mode

Value	Mode	Original Aspect Ratio	Notes
0	Stretch to fill screen	Preserved	
1	Stretch to fill screen X	Preserved	Other dimension might exceed the target area and become clipped.
2	Stretch to fill screen Y	Preserved	Ditto
3	Stretch X and Y to fill screen	Lost	
4	Stretch X & Y to layer 1	-	Match aspect ratio & size to layer 1
5	Stretch X & Y to layer 2	-	Match aspect ratio & size to layer 2
6	Stretch X & Y to layer 3	-	Match aspect ratio & size to layer 3
7	Stretch X & Y to layer 4	-	Match aspect ratio & size to layer 4

9.5.13 Mirror / Flip

Value	Effect	Notes
0	Normal	
1	Mirrored	Horizontal flip.
2	Flipped	Vertical flip.
3	Mirrored & flipped	

9.5.14 Number

The DMX channel value is used as sent, with no decoding.

Note that the media start and end frame parameters use 3 channels. Their range is therefore 0 to 16,777,215. At a typical frame rate of 30 frames a second, the largest value corresponds to 155 hours, or nearly 6½ days. Although this might seem excessive, it does mean that points within a media file can be specified with frame accuracy regardless of length or speed.

Values greater than the number of frames in the clip are taken to mean “the end”. i.e. a 200 frame clip will restart at 200 frames, rather than 6.5 days later, if the end frame is left at the default of 16,777,215.

9.5.15 Play Mode

Value	Action	Notes
0	Once	Play clip once, hold last frame (hold first frame if playing backwards).
1	Once-then-black	Play clip once, then go to black
2	Loop	Loop in the current direction of play
3	Bounce	Reverse direction at first/last frame.
4	First frame	Show start frame(*).
5	Last frame	Show the end frame(*).
6	Pause	Show the current frame, regardless of speed.
7	Next frame	Advance to the next frame then automatically pause(**).

(*) Note that these modes ignore playback speed and always show the selected frame. If the start or end frames are changed, the displayed frame will change. This allows the user to view the start and end points as they are moved around within a clip.

(**) Play mode must go back to Pause before this mode can be used again.

9.5.16 Scale

Pseudo-logarithmic scale factor with the values 0 to 65535 corresponding to a multiplication factor of 0.0 to 10.0, with 32768 being 1.0.

9.5.17 Screen Offset

Linear scale, with the values 0 to 65535 corresponding to an offset in screen position of -1.0 to +1.0. 32768 corresponds to 0, i.e. no offset. A value of 0 in the X position of a layer, for example, would move the layer one screen width to the left (-1), effectively taking it just out of view (if its width was unchanged).

9.5.18 Speed Factor

Speed is represented as a multiplier to be applied to the normal speed, with the values 0-65535 encoded linearly as follows:

Value	Speed Multiplier	Notes
0	-500%	Backwards at 5 times normal speed
26214	-100%	Backwards
32768	0	Stop
39321	100%	Forwards at normal speed
65535	+500%	Forwards at 5 times normal speed

9.5.19 Text Loop Mode

Value	Action	Text Behaviour
0	Loop	Scrolling loops round
1	Stop	Freeze
2	Bounce	Scrolling reverses direction
3	Off	Keep empty window
4	Black	Hide window
5	Pause-loop	Pause then loop (mode 0)
6	Pause-bounce	Pause then bounce (mode 2)
7	Pause-off	Pause then off (mode 3)
8	Pause-black	Pause then black (mode 4)

9.5.20 Transition Type

Not implemented yet.

10 Background Information

10.1 Video Clips

The following are good sources for video content:

http://www.stockfootageforfree.com/

http://www.motionbackgroundsforfree.com/

https://archive.org/details/movies

10.2 Files and Folders

MagicHD uses the following important files and folders:

…/Magic PC	
├─ *mqqt.exe*	MagicQ PC executable
├─ *mqhd.exe*	MagicHD standalone executable
├─ convert	incoming user media files for conversion.
│ ├─ 010	
│ :	
│ └─ 255	
├─ log	
│ ├─ *mqhd_xxxxx.log*	MagicHD log files
│ └─ conversion	media conversion log files
├─ show	
│ ├─ *index.csv*	media index
│ └─ media	media
│ ├─ 001	
│ :	
│ └─ 255	
└─ thumbs	
└─ local	thumbnails of the media in show/media

Appendix A Changes To DMX Personalities

Note that where changes are made to the personality, the updates are also made to the head files and MagicHD demo show that are installed as part of MagicQ.

A.1 Changes in Version 1.6.1.4

Colour Effect (9.5.5)

Value	1.6.1.3	1.6.1.4	Notes
3	Colourise	Posterise	Was marked as *Not implemented yet.*
4	Colourise B&W	Colourise	Name change only
5	Curve 1	Mask	See 9.5.5.
6	Curve 2	Key	See 9.5.5
7	Curve 3	Hue	See 9.5.5
8	-	Curve 1	*Not implemented yet.*
9	-	Curve 2	*Not implemented yet.*
10	-	Curve 3	*Not implemented yet.*

A.2 Changes in Version 1.6.1.6

HUD Control (9.5.10)

Value	1.6.1.5	1.6.1.6	Notes
255	-	Grid	New feature

Keystone (9.5.11)

Value	1.6.1.5	1.6.1.6	Notes
all	-1.0 to +1.0	0.0 to +1.0	Range and defaults changed.

Output Layer (9.2)

Channel	1.6.1.5	1.6.1.6	Notes
24	Keystone X	Keystone A	Name and effect changed.
26	*Keystone Y*	Keystone B	Was marked as *Not implemented yet.*
28	*Keystone A*	Keystone C	Was marked as *Not implemented yet.*
30	*Keystone B*	Keystone D	Was marked as *Not implemented yet.*
32	*Keystone C*	Keystone E	Was marked as *Not implemented yet.*
34	*Keystone D*	Keystone F	Was marked as *Not implemented yet.*
36	*Keystone E*	Keystone X	Was marked as *Not implemented yet.*
38	*Keystone F*	Keystone Y	Was marked as *Not implemented yet.*

A.3 Changes in Version 1.6.5.0

Output Layer (9.2)

Channel	1.6.1.6	1.6.5.0	Notes
41	-	Audio Volume	New

Media Layer (9.4)

Channel	1.6.1.6	1.6.5.0	Notes
41	-	Audio Gain	New
42	-	Audio Pan	New